

7

OIPE

RAW SEQUENCE LISTING

DATE: 09/07/2001

PATENT APPLICATION: US/09/828,302

TIME: 14:27:27

Input Set : A:\16313029.app

Output Set: N:\CRF3\09072001\I828302.raw

ENTERED

3 <110> APPLICANT: COSTA E SILVA, OSWALDO DA
4 VAN THIELEN, NOCHA
5 CHEN, ROUYING
6 ISHITANI, MANABU
8 <120> TITLE OF INVENTION: PHOSPHATASE STRESS-RELATED PROTEINS AND METHODS OF USE
9 IN PLANTS
11 <130> FILE REFERENCE: 16313-0029
13 <140> CURRENT APPLICATION NUMBER: 09/828,302
C--> 14 <141> CURRENT FILING DATE: 2001-08-20
16 <150> PRIOR APPLICATION NUMBER: 60/196,001
17 <151> PRIOR FILING DATE: 2000-04-07
19 <160> NUMBER OF SEQ ID NOS: 46
21 <170> SOFTWARE: PatentIn Ver. 2.1
23 <210> SEQ ID NO: 1
24 <211> LENGTH: 656
25 <212> TYPE: DNA
26 <213> ORGANISM: Physcomitrella patens
28 <400> SEQUENCE: 1
29 gcacgaggag gacaagtctt ccgaacccag cttagagtac tggttcaagt gtgtagacct 60
30 ggattgtgac gggatgatta tgctacgagg agatgcaata tttttacgag gagcaacttc 120
31 atcggatgga gtgcatggct caggagcctg ttctttttga ggatacgtt tgtcaaatga 180
32 cagatatgat cggacctgct aatgaaggac ggttgacact tcgggactta aagcgatgca 240
33 aattatctgg aaacttcttc aatatccttt ttaacctcaa caaattcgta gcttttgaga 300
34 ctctgtgatcc tttccttatt cgtcaggaga gagaggacct gtcattaact gagtgggac 360
35 gatttgacac cattgagtac atccgacttt caatggaaga agatggcgag gatgcctcca 420
36 acggcagtg ctaagtctgg gatgagcctg gttacgaagc ccccttttaa ccttctgttg 480
37 tccctcaaga tccaggcatt tgaatcatca gagcagagac ggacggcacg aagaattgcc 540
38 tgctggactt ttaagaaaac tggctctgtc aaccctttta aggttgatcat ttatatcgta 600
39 aagcatcttg ttgagtgcgc atcctgccta ggggaccctg tctctacttt aacatc 656
42 <210> SEQ ID NO: 2
43 <211> LENGTH: 807
44 <212> TYPE: DNA
45 <213> ORGANISM: Physcomitrella patens
47 <400> SEQUENCE: 2
48 cggcacgagg aagcagggtta gaacctcaat gtggatcccg gagctagagg aaatgggagt 60
49 ttgctgacaa atagtatgtt gcttaatcca aagggcttgg caccacgtct atcatcaaac 120
50 ggaggacctg tgacacgagg catgccgtaa tcagccagga ctttgtattt cctcctggag 180
51 gcattccgtc acttcatctt ccctcggtag tagtttggag taacgaaacg acattagtgt 240
52 cgagatgtag aagagtctac gcaaacgctc atgcatatca catcaactcc atatccaaca 300
53 acagcgattg tgagacatac atatctgcag atgatttgag aataaattta tggaaccttg 360
54 aagttagtga tcagagtttc aacattgttg acatcaaacc aacaaacatg gaagacctta 420
55 cagaggtgat aacgtctgca gagttccatc ctactcattg caatgtgtta gcatacagta 480
56 gcagcaaggg ctccattcga ctcatgtata tgcgtcaatc agccttgtgt gatcgacact 540
57 ctaaaagctgt ttgaggaaga actggagccc atcctggatc caagatcctt tttttcacag 600
58 aaatccatag cttcaatttc tgacattaag tttgcaagag gcgatcggtta cattctccag 660
59 tcggggacta catggactct gaaactgtgg gatgtgaaca tggaatctgg tccctgtggc 720
60 acgtatttaa agtccacgag catttgcgac caaagcttcg tgatctctat gagaacgatt 780

RAW SEQUENCE LISTING

DATE: 09/07/2001

PATENT APPLICATION: US/09/828,302

TIME: 14:27:27

Input Set : A:\16313029.app

Output Set: N:\CRF3\09072001\I828302.raw

61 cacctccgat aattgatgtg tccgggg 807

64 <210> SEQ ID NO: 3

65 <211> LENGTH: 447

66 <212> TYPE: DNA

67 <213> ORGANISM: Physcomitrella patens

69 <400> SEQUENCE: 3

70 ggcacgagga agtatggaaa tgccaatggt tggaagtact tcacggatct gttcgactac 60

71 ctgcctctga cagctctcat tgagcacgag attttttgtc ttcattggtg tctgtctcca 120

72 tcgctcgaca cattagatca catccgagcc ctatgctgta ttcaagaagt gccgcacgag 180

73 ggcccgatgt gtgatctact ctggtctgat ccagatgac gttgtggatg gggattttca 240

74 ccacgaggtg ccggttatac ttttgggtcaa gatattgcag agcagttcaa tcataccaat 300

75 ggtctaagtt tgggtgcacg tgctcaccag cttgtgatgg aaggatacaa ttggtgccag 360

76 gataaaaatg ttgtcacagt tttcagtgcc cccaattact gttaccgctg tgggaacatg 420

77 gccgccataa tgggagatag atgaaac 447

80 <210> SEQ ID NO: 4

81 <211> LENGTH: 591

82 <212> TYPE: DNA

83 <213> ORGANISM: Physcomitrella patens

85 <400> SEQUENCE: 4

86 gcaccaggtt actgtggggc ctgcgtccccc ggaagagcat gttagctggg gttagagagc 60

87 tagggcagtg agtgccgac attttttgcg cagcgcgtatc gatttgcaag ggcgaagtgc 120

88 acaagagggg tgggaattta tctttgctct ccaaagactg acaagacatc cgaagatgat 180

89 gagaatgccg agttacgcta tggtttatca gccatgcaag ggtggcgcg tagcatggag 240

90 gatgcacaca aagctatctt aaacgttgat aagaacacgt caacatcaat atttggcatc 300

91 tttgatggtc acggaggtaa attggtggca aaattttgtg caaagcactt acaccaagag 360

92 gttctgaagt ctgaagcgta cgctaaagggt gacttaaaaag caagtttgga atattccttt 420

93 ttacggatgg atgagatgat gaaggagca agtgggtgga aagagcttca aagtttgga 480

94 gaaacaagta gtcagcttga taaactcggg aatggaaata gtcctcttaa tgcgagggag 540

95 gatgacgaaa gtgattattc ctatgctgtg ctaactgaaa gcaatgatag t 591

98 <210> SEQ ID NO: 5

99 <211> LENGTH: 587

100 <212> TYPE: DNA

101 <213> ORGANISM: Physcomitrella patens

103 <220> FEATURE:

104 <221> NAME/KEY: modified_base

105 <222> LOCATION: (9)

106 <223> OTHER INFORMATION: a, t, c, g, other or unknown

108 <220> FEATURE:

109 <221> NAME/KEY: modified_base

110 <222> LOCATION: (283)

111 <223> OTHER INFORMATION: a, t, c, g, other or unknown

113 <400> SEQUENCE: 5

W--> 114 cggcacacg tttgtaccgc catttacaga aattgccacc caacatgggg gaatgtctag 60

115 tgaggttctt cagtcaagcc tttaagcaga ccgaggagg gtttttgga atcgtaagg 120

116 attcatggct cacgaagccc cagattgctg ccgttggttc ctgttgctg gtaggtgtg 180

117 tgtgggagtg taagctgtac atcgccagcc tgggtgattc taaggctgtg ctcggtagat 240

W--> 118 tctctcgcaa tttgcaatca gtaattgcga cggagatat cttctgagca taacgccagt 300

119 gttgaggctg ttaggcagga cctgcaagct gcgcactctg atgacccgag cattgttgtg 360

120 ctgaggcacg gagtgtggcg tgtgaagggt ttgattcaag tctctcgatc cattggcgac 420

RAW SEQUENCE LISTING

DATE: 09/07/2001

PATENT APPLICATION: US/09/828,302

TIME: 14:27:27

Input Set : A:\16313029.app

Output Set: N:\CRF3\09072001\I828302.raw

```

121 gtttatctga agaaggctga gttcaaccgt gagcctctaa tcggccggtt ccgcctgcca 480
122 gagccgctcc agagaccggt catgagcgcc gagccggaca tccgagtaat cgatctgacc 540
123 ccagatgtgg agttgtgatt ttgcatcaga tgggttgtgg gagcact 587
126 <210> SEQ ID NO: 6
127 <211> LENGTH: 2559
128 <212> TYPE: DNA
129 <213> ORGANISM: Physcomitrella patens
131 <400> SEQUENCE: 6
132 atcccgggca tcgggaaaga cgggtgtgtgt gtgtgtgtgt gtttgcttgc ttgcatgcat 60
133 tgtggggggg acccagatca tgcttcaggg aggtttggag tgcgccaat ggagcccttg 120
134 acgttggccg tggcagatct ggaccccgat ctgcttcaac tccctgcgga tttcaccccc 180
135 tttgcttctc cttcatcgtc atcgctgct tctgtgggag ttagcaacaa gcttgagggt 240
136 gttttagagt tgcacttggg ggagctttac gcgcaatgga tttcgtgcc cgacacgacg 300
137 cgtctgttta cgaatttgtt ggaagaagca aaaggaggag ctggacaccc aaatgttggc 360
138 ctatcacttt tgccagggtc tctatctgga gccgcaggaa gcaactcccc gttgcctcct 420
139 cggagctctg gttcaccaat gtctcccagg tcgcctttca gcagacgtat gggaactagc 480
140 cacctcatgc gggactctcc gttgaagaaa agtagcgaac ctgtgcgaga gatcataccc 540
141 cagttctatt ttccgaatgg gcccccgcca tcgaaggata ccattgagtc gtgcatggct 600
142 cgcgtaaacc aaatattcgg agctcatcca gaaggtttac ctgcatcagc atttgcaacc 660
143 attactaagg atgtatgcaa actaccgtcc ttcttctcca tggctttatt caaaaagatt 720
144 gacatcaata atacaggctt ggttacaagg gacaagttcg tagaatactg ggtggaccaa 780
145 aacatgctgg ccatggacac tgcaactcgc gtcttctactg tgttgaagca acccgacaag 840
146 aattttctga gacaggaaga ttttagggcc gttttacgag aattgttgtt gacgcatcgc 900
147 ggtttggaat ttctccatga cccccggag tttcaagaca gatatgctga aactgtaata 960
148 tacagaatat tctaccatgt aaatagagct gggaatggtc ggctacaact tagagagtta 1020
149 aagcggagta atttaattgc tgctcttcag caagtggatg aagaggaaga catcaacaaa 1080
150 gtgttacggt acttctcata tgaacatttt tatgtcatat attgcaagtt ctgggagctg 1140
151 gattcagatc acgatttttt aatagacaaa gatgatctcc ttcgatatgg aaatcatgct 1200
152 ctcacctacc gaatcgtaga gcgtatcttt tcccagggtc caagaaagtt caccagcaaa 1260
153 gtagctggaa agatgggtta tgaagacttc gtatggttta ttctttcaga agaggacaa 1320
154 tcttccgaac ccagcttaga gtactgggtc aagtgttag acctggattg tgacgggatg 1380
155 attatactaa atgagatgca atatttttac gaggagcaac ttcatcggat ggagtgcag 1440
156 gctcaggagc ctgttctttt tgaggatata gtttgcataa tgacagatat gatcggaact 1500
157 gctaataaag gacggttgac acttcgggac ttaaagcgat gcaaattatc tggaaacttc 1560
158 ttcaatatcc tttttaacct caacaaattc gtacttttg agactcgtga tcctttcctt 1620
159 attcgtcagg agagagagga cccgtcatta actgagtggg atcgatttgc acacattgag 1680
160 tacatccgac tttcaatgga agaagatggc gaggatgcct ccaacggcag tgctgaagtc 1740
161 tgggatgagc ctggttacga agccccctt taaccttctg ttgtccctca agatccaggc 1800
162 atttgaatca tcagagcaga gacggacggc acgaagaatt gcctgctgga cttttaagaa 1860
163 aactggtctg tgcaaccctt taaaggttgt ccatttatat cgtaaagcat cttgtttgag 1920
164 tgagcatcct gcctaggggg accctgtctc tactttaaaa tcagacaatg catgtgacat 1980
165 ttgtacagtt cacaatggc agcattttac tatttaggaa gtccttcaac attatatctt 2040
166 tcaggctctc agctcgccat ttacgggtgc tactgtaact cgagtccttg tgcaagaatc 2100
167 atgaagaata ctgagcatgg cgacgtccaa aacttcgaga caacgtcaaa gaactacttg 2160
168 accggtctct caacaagttc tgttacttaa gtgcacagca ctggggtagc cctcttgctt 2220
169 tcaaaatcac tgtgtgtgac actgtagcta ctacttcagg gaaattgatg ttgggcattc 2280
170 taggccttct gagctttttt tgcaggctct tttgatggtc tccgtcacgt tatttgttta 2340
171 ggaatgaagc agcctgcccga ggatagtgat gtagacatgg tcccgtttct gatcttctca 2400
172 atcaggctta accatgcagt aattaagcag gtaggcacag tgtgctcaac acgtaatccc 2460

```

RAW SEQUENCE LISTING

DATE: 09/07/2001

PATENT APPLICATION: US/09/828,302

TIME: 14:27:27

Input Set : A:\16313029.app

Output Set: N:\CRF3\09072001\I828302.raw

```

173 cttccacac tagtcttctc tgtagactct ttatttcagc ttttgatccg gaacttaaag 2520
174 cttttgactg gttcagcccg aggctggtag cgttaacgc 2559
177 <210> SEQ ID NO: 7
178 <211> LENGTH: 2005
179 <212> TYPE: DNA
180 <213> ORGANISM: Physcomitrella patens
182 <400> SEQUENCE: 7
183 atccccgggtg gtggtggcgg tgaagttatt acccgagagc ttcgacagct tcacgcatgt 60
184 ttgcgattgc acgcaaggac gcaactggct ccgtagttgt aatgaatgga ttcaccgcga 120
185 tgcaagcttc tcaacgagcc gttggaagct tcgtgtggtg gagtgtggaa actgccggag 180
186 ctccgtaacc atgcgggggt catggaagtg gtggctgccca attcggaggc ggatttcaat 240
187 gtggtagagt ttggacttag agttttgtag gaggaggggt tgaagtgtgg gccaaagtgt 300
188 ggggctcctg aaacagggga aaagaaaaag agacgacgac gccggagatt ggagattgag 360
189 gtgtgtgtgt gtgtgtttgt ggttagttta gcggtttgaa gtgatgatca gtggtgcaag 420
190 cggggcaccg gctggggccc cagttcccac tgctactggt tctgttgctg cgccattgcc 480
191 cgcgttggag tggaaattct cgcaggtttt cggcgagcgt gccatcggag aggaagtgca 540
192 agaagtgtat attatctcgg ctattgagtt tgataagact ggagaacatt tggcgactgg 600
193 cgacagagga ggacgcgttg tactttttga gagaacagat ggcaaagatc aaaggacacg 660
194 gagagagttg gaaagagctg attctgcggg gtccaggcat cctgaatatc gatactctac 720
195 cgagtttcaa agtcatgaac cagagtttga ttacttgaag agtttgaaaa tagaggagaa 780
196 gatcaataaa attagatggt gtcagactgc caacgccgct cagttcttaa tttctacgaa 840
197 tgacaaaacc attaaattat ggaaggtgac tgaaaagaaa gtgaagcaag tcaagaacct 900
198 gaatgtggat cctggagcca gagggaatgg aaaccattg tcgaataaca tgatgctcaa 960
199 tccaaagggt tttgcaccac ggttgctgat gaatggagtt gccgcgaacc gatctacgcc 1020
200 tgccatcagc cctgactttg tatttcctcc tggaggcatt ccgtctcttc atcttccctc 1080
201 ggtatggagt aacgagacgg cattagtgtg gagatgtaga agagcctacy caaacgctca 1140
202 tgcatatcat atcaactcca tatctaacia cagcgattgt gagacataca tctctgcaga 1200
203 tgatttgaga ataaatttat ggaatcttga agttagtgtat cagagtttca atattgttga 1260
204 catcaaacca acaaactatg aagaccttac agaggtgata acgtctgcag agttccatcc 1320
205 ttctcattgc aatgtgttag catacagtag cagcaagggc tctattcgac tcattgatat 1380
206 gcgtcaatca gccttggtgt atcgacattc aaagctgttt gaggagactg agcatgctgg 1440
207 atcaagatcc ttttttacag aaatcatagc ttctatttct gatattaagt ttgcgagagg 1500
208 cggtcggtac attctgagtc gggactacat gactctgaaa ttgtgggatg tgaacatgga 1560
209 atcttccctt gtggccgtat ttaaagtcca cgagtatttg cgtccaaaagc tttgtgatct 1620
210 ctatgagaac gactccatct tcgacaagtt tgaatgttgt cttagtggg atggcatgcy 1680
211 tgtggcaact ggttcctaca gcaacttggt ccgggtgttt ggggccgcta ccggaagtga 1740
212 ggaagcgtca accttggaag cttagcaagac tccaaacagg cgtatcgtga cacctccctc 1800
213 aaaagctgga agtcgactag ccaatcttgc tcgtggtcgg cgtgataacc gtcgaggtgg 1860
214 agaaagccca ggtatagatt tgaatggggg agtgcaagat ttcacatcaa agcttttgca 1920
215 cttagcatgg catccagcag cgaatgtgat cgctttcgcg cttagcgcgtt gctcgcgtgca 1980
216 tccaacagct tgtacatgtt aacgc 2005
219 <210> SEQ ID NO: 8
220 <211> LENGTH: 1365
221 <212> TYPE: DNA
222 <213> ORGANISM: Physcomitrella patens
224 <400> SEQUENCE: 8
225 ggcgttaacg cgcggaggag agcggatcgg ttagggtttg gtgccagggg ggagggcaga 60
226 ggttgggaca atgccgtcat atgcagatgt agaccggcag atagagcagc tgtcggagtg 120
227 caagccgttg tcggagttgg aggtgaagaa cctatgtgat caagctcgga cgatcttggt 180

```

RAW SEQUENCE LISTING

DATE: 09/07/2001

PATENT APPLICATION: US/09/828,302

TIME: 14:27:27

Input Set : A:\16313029.app

Output Set: N:\CRF3\09072001\I828302.raw

```

228 ggaggagtgg aacgtgcagc ccgtgaagtg tcctgtcacg gtttgcggtg acatccatgg 240
229 ccagtttcat gatctcatcg agcttttccg cataggaggc aaggcgcccg acacgaacta 300
230 cttgttcatg ggcgactatg tggatcgtgg atattattct gtcgagactg tgcgctctt 360
231 agtggccctg aagggtgcgg atagggatag gatcacaatc ttgcgaggga accacgagag 420
232 caggcagatt acgcaagtat atggtttcta tgatgaatgc ctgcggaagt atggaaatgc 480
233 gaatgtttgg aagtacttca cggatctgtt cgactacctg cctctgacag ctctcattga 540
234 gcacgagatt ttttgtcttc atggtgggtc gtctccatcg ctcgacacat tagatcacat 600
235 ccgagcccta gatcgatttc aagaagtgcc gcacgagggc ccgatgtgtg atctactctg 660
236 gtctgatcca gatgatcgtt gtggatgggg catttcacca cgaggtgccg gttatacttt 720
237 tggccaagat attgcagagc agttcaatca taccaatggt ctaaagtttg ttgcacgtgc 780
238 tcaccagctt gtgatggaag gatacaattg gtgccaggat aaaaatgttg tcacagtttt 840
239 cagtgccttc aattactgtt accgctgtgg gaacatggcc gccataatgg agatagatga 900
240 aacaatgaat cggctctttt ttcagttcga accagcaccg cggcaaagtg aaccagatgt 960
241 gacgcggaag actcctgatt actttctgta aacatggcct atacatggta ccttttactt 1020
242 actgaattgt tctgtatagt caccttccat ggaagcagtt tgccctgaa tgaagatact 1080
243 ccctcatgat ctagtagtat gaagttatct tctttgaagt gtttgttccc ttttttagta 1140
244 cttgtctctc tgttcattca taaagtggcc ttcagaacaa ctgagatgtt gtgaatgtaa 1200
245 ctgcgacaag aggagcagtg tcaatgggtt caagggttat agtgattagg gaaagaaggt 1260
246 agcacatgtt acttcaaadc gatcagagac ttctatggaa aagatgacga tggtggaac 1320
247 aacgttcatc tccacaccta ctgtatatgg catgctcgag ctgcg 1365
250 <210> SEQ ID NO: 9
251 <211> LENGTH: 1346
252 <212> TYPE: DNA
253 <213> ORGANISM: Physcomitrella patens
255 <400> SEQUENCE: 9
256 gcgatatcga tttgcaaggg cgaagtgcac aagagggatg ggaatttata tttgtctctc 60
257 aaagactgac aagacatccg aagatgatga gaatgccgag ttacgctatg gtttatcagc 120
258 catgcaaggg tggcgcgata gcatggagga tgcacacaaa gctatcttaa acgttgataa 180
259 gaacacgtca acatcaatat ttggcatctt tgatgggtcac ggaggtaa at tgggtggcaaa 240
260 attttgtgca aagcacttac accaagaggt tctgaagtct gaagcgtacg ctaaagggtga 300
261 cttaaaagca agtttggaat attccttttt acggatggat gagatgatga agggagcaag 360
262 tgggtggaaa gagcttcaaa gtttgaggga aacaagtagt cagcttgata aactcggtaa 420
263 tggaaaatgc tctctaatg cgagggagga tgacgaaaagt gattattcct atgctgtgct 480
264 aactgaaaagc aatgatagta acttggccac taaaaagcat aaatattcag atttccaggg 540
265 tcccatttat gggagtactg cagtgggtggc tctgattcgt ggcaataaac tgttcgtcgc 600
266 aaacgctgga gactctcgtc gcataatgtc tcgacgtggc gaggtctgaa atctctcgat 660
267 tgatcacaaa cccaacctag agcatgagag gaaaaggata gagagtgtg gaggtctcgt 720
268 ccatgggtgt cgtgttaacg gtatgtctaaa tcttacaaga gcaatagggg acatgggaatt 780
269 caagggtcga cctgatttgc cacctgacaa gcaagtagtg acgtgctgtc ccgatgttgt 840
270 cgaagttgac cttggaccgg gggatgaatt tatcgtgctg gcctgtgatg gaatatggga 900
271 tgttatgtct agtcaagctg tcgtggactt cgttaaatca agattaccta ccacaaaaac 960
272 tctatcatct ttgtgtgagg agatactgga ttactgcttg tccccaacca cccgccagca 1020
273 agaaggatgt gataacatga gcatcattat agtccaacca aagcaatcgg gagttgcagc 1080
274 atcttcttcc acagattgac gttgatgacc ttcgtcggac gctggagctc aaaactcatt 1140
275 gtggacttca acttctgagt tcaaagttcc ttgtagactt cttgtcatgt ccaacttcta 1200
276 cctaatttctg aatttcaaaa gacttaataa taaacctaga tataggctga tcataaaatt 1260
277 tcgggtcaaa ggcgttatgg tcttctattc aaatataagg tgaattaatg ctaaaaactg 1320
278 gagttgcctt ctgccttcga tatcgc 1346
281 <210> SEQ ID NO: 10

```

VERIFICATION SUMMARY
PATENT APPLICATION: US/09/828,302

DATE: 09/07/2001
TIME: 14:27:28

Input Set : A:\16313029.app
Output Set: N:\CRF3\09072001\I828302.raw

L:14 M:271 C: Current Filing Date differs, Replaced Current Filing Date
L:114 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5
L:118 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5